

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to Hand-rails

I, DEREK PERCIVAL MUDD, a British Subject, of Lionweld Limited, Marsh Road, Middlesbrough, Yorkshire, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to handrails such as are used on stairways and the like. It is more particularly concerned with handrails of the tubular type.

When constructing a tubular or other handrail system, particularly on stairways, landings and the like, a considerable part of the expense involved is due to the difficulties which are experienced in forming the parts of the handrail which are situated at bends and corners. This is particularly the case at places where it is desired to carry the handrail from one flight of steps, along an intervening platform, and then up or down a second flight of steps. It is difficult to prefabricate the necessary bends, since unless they are formed on the site it is practically impossible to make them fit exactly. It is the principal object of the present invention to provide an improved device for forming bends in a handrail by means of which the above difficulty may be overcome.

According to the invention a member is provided which is adapted to be used to provide a curved section in a handrail between two adjacent tubular sections thereof, comprising a length of coiled spring having at each end a connector for connecting it with the adjacent section of handrail, wherein each of the connectors comprises a first dowel portion formed with an external screw thread which is screwed into the end of the spring to attach the connector to the latter and a second dowel portion which is adapted to be fitted into the end of the adjacent tubular section of handrail and which is formed externally with a plurality of spaced depressions into which the material of the tubular section can be

forced by punching in order to secure the connector to the tubular section.

Further features of the invention will become apparent from the following more detailed description of one embodiment thereof, which will be given by way of example. Reference will be had to the accompanying drawing which shows a spring section or member exemplifying the invention and the method of attaching it to the adjoining tubular sections of handrail.

Referring to the drawing, the spring section comprises a length of coiled spring 1, each end of which is attached to a connector 2, by means of which it is connected to the adjoining section of tubular handrail 3. The spring section 1, which is tightly coiled with its turns normally in contact, is made of spring steel or other suitable resilient material and it has an external diameter which is substantially equal to that of the adjoining tubular rail section 3. The connectors 2 may advantageously be made of cast malleable iron, but other materials may be used, including steel, bronze, aluminium and aluminium alloys.

Each of the connectors 2 comprises two dowel portions 4 and 5 which are separated from each other by an integrally formed collar 6. The outer diameter of this collar is made equal to that of the rail sections 3.

The dowel portion 4 of each connector is formed with a helical groove 7, the pitch of which is equal to that of the spring 1, when unstressed. The diameter of the dowel portion 4 and the depth of the groove 7 are made such that when the connector 2 is fitted into the spring 1 by a screw action the spring resiliently grips the dowel portion 4, without it being necessary to provide any additional means of connection between the parts.

Each dowel portion 5, which is made a good sliding fit in the end of the tubular section 3, is formed with a plurality of depressions 8 which are spaced longitudinally

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and circumferentially on it, as shown. The dowel portion 5 meets the collar 6 at a sharp right-angle, which may be slightly undercut or grooved, as shown at 9, for convenience in manufacture, in order that sections of tubular rail 3 having square-cut ends may fit close against the face of the collar. The angles on the opposite sides of the collars 6 may be rounded as indicated at 10, around part or whole of the circumference of the dowel portions 4.

It is intended that the rail sections 3 should be secured to the dowel portions 5 of the connectors 2 by punching the walls of the sections 3 so as to produce internal projections which engage in the depressions 8 in a manner similar to that described in the Specification of my Application No. 15805/52 (Serial No. 733078) filed 23rd June 1952. To this end the depressions 8, each of which extends only partly round the dowel portion 5, are preferably made of elongated form, as shown, with their longer axes arranged circumferentially of the dowel portion, while the depth of the depressions is made a maximum near their centres, decreasing towards their ends, for the reasons mentioned in the said Specification.

Furthermore the collars 6 are preferably provided with guide marks or notches 11 which are aligned longitudinally with the centres of the depressions 8 so as to indicate the positions of the latter circumferentially of the dowel portion 5, when the latter are covered by the ends of the tubular sections 3. This enables the positions at which the punch marks are to be made in the sections 3 to be determined in the circumferential direction. The planes which pass through the axis of each connector and through the centres of the depressions may be at right angles to each other or they may intersect at angles of 60° and 120°, in order to facilitate casting.

In order that the longitudinal distances from the ends of the tubular sections 3, and hence the correct positions of the punch marks, may be ascertained, the depressions 8 are formed in the dowel portions 5 with their centres at distances from the faces of the collars 6 which are equal to a standard distance or to an exact multiple of this standard distance.

The connectors 2 may be formed with internal bores 12, if desired, or these may be omitted. It may be noted here that in the case of fittings made of a soft or malleable metal it may be necessary to omit the bores 12 or, alternatively, to fill them with plugs made, for example, of cast iron or some other material of sufficient strength to ensure that the dowel portions 5 will withstand the punching operation without risk of being damaged or deformed thereby.

The spring section 1 and connectors 2 may be manufactured in several different sizes. Thus a number of sections or members of

various lengths can be manufactured in order to suit different circumstances and bends of different degrees, of sharpness. Furthermore, spring sections and connectors having different diameters can be provided for use with tubular rail sections of different sizes.

In order to form a bend in a handrail it is only necessary to select a spring section 1 of the appropriate size having its connectors 2 attached to it by screwing the threaded dowel portions 4 into the ends of the spring section, to fit the other dowel portions 5 of the connectors into the ends of the adjacent tubular rail sections 3, the spring section 1 being bent in accordance with the angle between the rail sections, and then to secure the dowel portions 5 to the rail sections 3 by punching the latter in the manner described in my aforesaid Specification.

In certain circumstances the spring section 1 may, according to a further feature of this invention, be covered with a flexible or resilient sleeve (not shown) which may be made of a synthetic plastic material. A plasticised polyvinyl chloride is very suitable, since it can be shrunk onto the spring section when the latter is manufactured, while it is sufficiently flexible and resilient to allow the spring section to be bent as necessary without the sleeve being damaged. Such a sleeve also adapts itself to the turns of the spring so as to form a somewhat ribbed surface. This is often an advantage for it forms a good gripping surface.

What I claim is:—

1. A member which is adapted to be used to provide a curved section in a handrail between two adjacent tubular sections thereof, comprising a length of coiled spring having at each end a connector for connecting it with the adjacent section of handrail, wherein each of the connectors comprises a first dowel portion formed with an external screw thread which is screwed into the end of the spring to attach the connector to the latter and a second dowel portion which is adapted to be fitted into the end of the adjacent tubular section of handrail and which is formed externally with a plurality of spaced depressions into which the material of the tubular section can be forced by punching in order to secure the connector to the tubular section.

2. A member as claimed in Claim 1, wherein the relative dimensions of the screwed dowel portions of the connectors and of the spring are such that the ends of the spring are expanded by the introduction into them of the dowel portions so that the spring by its resiliency grips the dowel portions.

3. A member as claimed in Claim 1 or Claim 2, wherein the spring is covered by a sleeve made of a flexible material.

4. A member as claimed in any of the 130

preceding Claims, wherein the depressions in the second dowel portions are of elongated form with their longer axes arranged circumferentially of and extending only partly round the dowel portion.

5. A member as claimed in Claim 4, wherein the depth of each depression is a maximum near its centre and decreases towards its ends.

6. A member as claimed in any of the preceding Claims, wherein the dowel portions of each connector are separated from each other by means of an integrally-formed collar.

7. A member as claimed in Claim 6, wherein the collar of each connector is provided with guide marks which are aligned longitudinally with the depressions so as to indicate the positions of the latter circumferentially of the connector when the depressions are covered by the adjoining tubular section

of rail.

8. A member as claimed in Claim 6 or Claim 7, wherein the depressions of each of the second dowel portions are spaced at a plurality of different distances from the collar and wherein the distance between the centre of each depression and the collar is made equal to a standard distance or to an exact multiple of this standard distance.

9. A member for forming a curved section of handrail substantially as herein described with reference to the accompanying drawing.

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PROVISIONAL SPECIFICATION

Improvements in or relating to Hand-rails

I, DEREK PERCIVAL MUDD, a British Subject, of Lionweld Limited, Marsh Road, Middlesbrough, Yorkshire, do hereby declare this invention to be described in the following statement:—

When constructing a tubular hand-rail system, particularly on stairways and the like, a considerable part of the expense involved arises from the difficulties which are experienced in forming the parts of the hand-rail which are situated at bends and corners. This is particularly the case at places where it is desired to carry the hand-rail from one flight of steps, along an intervening platform and then up or down a second flight of steps. It is difficult to prefabricate the necessary bends since, unless they are formed on the site, it is practically impossible to make them fit exactly. It is the principal object of the present invention to provide an improved method of and means for forming bends in a hand-rail by means of which the above difficulty may be overcome.

According to the invention, in one of the aspects thereof, a bend in a handrail is provided utilising a coiled spring section having an external diameter corresponding substantially to the diameter of the hand-rail, the ends of which spring are connected to the adjoining sections of hand-rail in alignment therewith and the part of the spring between the said sections being curved in accordance with the angle between the said sections.

The invention is particularly applicable to tubular hand-rails and in accordance with a further feature of the invention the aforesaid spring section is connected at its ends to each of the adjoining tubular hand-rail sections by means of a connector having a pair of oppositely-directed dowel portions, one of which latter is formed with a screw-thread

and provides a screw connection with the end of the spring section and the other of which is fitted into the end of a tubular section of rail and is formed with a plurality of spaced depressions, which depressions receive internal projections which are produced in the tubular section by punching the wall of the latter in order to lock the dowel portion in the tubular section.

The provision of connectors for connecting the spring section with the adjoining tubular sections forms an important feature of this invention.

Such connectors, according to a preferred construction, may each consist of two dowel portions which are separated from each other by means of an integrally-formed collar, the outer diameter of which is preferably equal to the external diameter of the tubing used for the tubular hand-rail sections which are to be connected together by the spring section. One dowel portion of each connector is formed with spaced depressions in the manner described in my co-pending Patent Application No. 15805/52 (Serial No. 733078) while the other dowel portion is formed with a spiral groove forming a thread which receives the first few turns of the spring section. The internal diameter of the spring section relatively to the outer diameter of the dowel portion is such that the former grips the latter resiliently so that the parts are held securely without any form of bonding.

The spring sections may be manufactured in a number of different standard sizes. Thus spring sections of different diameters could be provided for use with rail sections of different sizes, while it is also possible to provide spring sections of different lengths to suit different requirements.

In order to form a bend in a hand-rail in

accordance with this invention it is only necessary to select a spring section of the appropriate size, fit connectors to the ends of the spring section by screwing the threaded
5 dowel portions into the ends of the said section, fit the other dowel portions of the connectors into the ends of the adjacent tubular rail sections, the spring section being bent in accordance with the angle between
10 the rail sections, and then secure the dowel portions to the rail sections by punching the latter in the manner described in my aforesaid Application No. 15805/52. (Serial No. 733078)
15 The spring section must be formed so that the turns of the spring are sufficiently close to one another to avoid any danger of the hand being pinched, when the rail is in position. In certain circumstances the spring section may, according to a further feature
20 of this invention, be covered with a flexible or resilient sleeve which may be made of a synthetic plastic material. A plasticised polyvinyl chloride is very suitable since it can be shrunk onto the spring section when
25 the latter is manufactured, while it is sufficiently flexible and resilient to allow the spring section to be bent as necessary without the sleeve being damaged. Such a sleeve also adapts itself to the turns of the spring so as

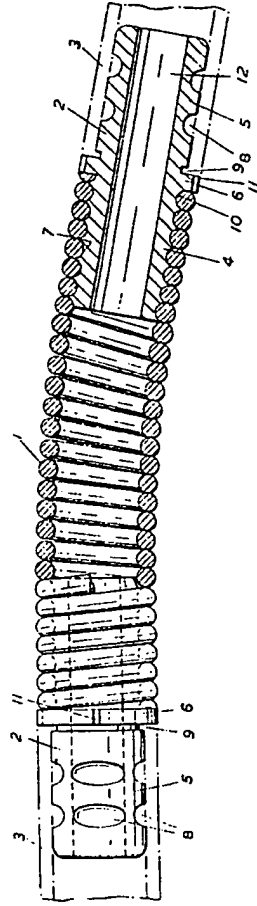
to form a somewhat ribbed surface. This is an advantage for it forms a good gripping surface. 30

The connectors used may be solid or hollow and they may be made of any suitable material such as steel or malleable cast iron. 35 When a hollow or tubular connector is made of a malleable material it will generally be found necessary to support the walls of the connector by providing it with a core made of a stronger material. 40

It is preferred also, particularly when the connector is made of a malleable material, that the corners where the dowel portions join the collar should be "radiussed" or rounded in order to provide additional 45 strength. In this case the ends of the tubular rail sections should be internally chamfered so that they will fit close up against the collar and provide a substantially smooth external surface without gaps. 50

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